US EPA OECA
AIR INSPECTION REPORT

Inspection Dates: **September 26 – 30, 2016**

Type of inspection: Clean Air Act, Partial Compliance Evaluation
Company Name: **EOG Resources, Inc.**
Facility Names: **Eagle Ford Oil and Gas Production Sites**
Physical Location: 1900 Ridgewood Pkwy, San Antonio, TX 78259-1828
Sites: Gonzales, LaSalle, Karnes, Dewitt, and McMullen Counties, TX
Mailing Address: Main Office: 1111 Bagby Sky Lobby 2
Houston, TX 77002
County/Parish: **Harris County**
Reg. Programs: **SIP, NSPS OOOOa**
SIC Code: 1311, 1321

Facility Representatives:

Gordon Goodman	Safety and Environmental Director	817-344-1156
Jim Guiliani	Division Production Manager	210-403-7728
Dale Willenbring	Facilities and Pipeline Manager	210-483-4444
Kevin Shomette	Environmental Supervisor	201-471-0948
Darryl Burger	Safety Manager	713-651-7072

EPA Inspectors:

Stephen Rieck	Environmental Scientist	404-562-9177
Cary Secrest	Environmental Protection Specialist	202-564-8661

EPA Inspector: /s/ 10/19/16
Cary Secrest (Date)

EPA Inspector: /s/ 10/19/16
Stephen Rieck (Date)

Summary

This inspection report is comprised of two sections:

- **Section I – Introduction** includes the following topics:
    - Purpose of the Inspection,
    - Facility Description
- **Section II – Observations**

Section I – INTRODUCTION

PURPOSE OF THE INSPECTION

On September 26, Steve Rieck and I (Cary Secrest) presented our credentials to the site security officer at the San Antonio office where we received office building passes. We met with the above-referenced facility personnel and described the purpose of the inspection; for the remainder of the morning and afternoon we attended a lengthy health and safety training session presented by Mr. Burger, focusing on hydrogen sulfide in oil and gas production fields.

Our inspection objective was to visit as many multi-well production facilities as time allowed to assess, through FLIR camera optical gas imaging and photoionization detection (PID), the extent of excess VOC emissions from storage tanks, Enardo valves, flares, "Fisher" pneumatic tank level controllers, and other process equipment.

FACILITY DESCRIPTION

EOG's multi-well production facilities have storage tanks and other equipment that process the natural gas and liquids, including produced water, from multiple wells. The facilities have 3-phase separators, heater-treaters, vapor recovery towers (at some), and 500 barrel storage tanks that separately contain crude oil, produced water, and in some cases pentane used for crude oil blending. The tanks have automatic level gauging, therefore the thief hatches are not routinely opened. EOG stated that they store all of the produced water in tanks; the rectangular "ponds" that are apparent in Google Earth images are fresh water ponds used for drilling wells.

EOG's facilities are permitted by TCEQ. Each facility has a site-specific VOC emissions limit. Emissions reporting is not required by TCEQ.

EOG employs field personnel trained in the use of FLIR GF320 optical gas imaging cameras. Each facility is scanned every 6 months for "find and fix" VOC leak detection and repair. EOG personnel said that common issues include failed Enardo valve gaskets which EOG is replacing with more robust gaskets, and restricted vent pipes (gas flow restricted by rust) which can trigger tank thief hatch pressure release valves to open and emit VOCs. EOG described a "roto-rooter" type device they used to clean out restricted vent pipes to abate emissions.

EOG is in the midst of a program to convert their Fisher pneumatic controllers, which often leak VOCs, from natural gas-actuated to compressed air; 265 multi-well facilities have been converted to compressed air and the remaining 400 will be converted by the end of 2019. EOG believes they are ahead of their competitors in eliminating VOC emissions from the controllers by converting to compressed air.

Section II – OBSERVATIONS

We conducted our ground-level emissions surveys using the following equipment:

- IR camera manufactured by FLIR, Model GF320, serial number 444401737. Optical gas imaging (FLIR camera recordings) of emissions sources were normally conducted first in visible light mode, then high sensitivity mode (HSM) for screening purposes, and then in full automatic mode (auto).
- PIDs cannot detect methane, ethane, or propane. We used a PID manufactured by Rae Systems called the "ppbRae3000," serial number 594-901619, to confirm that emission plumes contained regulated VOCs including butane and higher molecular weight compounds.
- We recorded the Lat/long coordinates for each site using a Garmin GPS which displayed the coordinates in degrees, minutes, and seconds. The record below presents the coordinates converted to decimal format using an on-line converter. We recorded the local wind speed and direction using a hand-held weather monitor (Kestrel NV4500).
- Messrs. Goodman and Giuliani escorted us during the field surveys.

The PID calibration record is in the "OECA Photo-ionization Detector Calibration Records" file maintained by Cary Secrest. The PID calibration checks were normal, and PID and IR camera time log was checked each morning against the National Institute of Standards and Testing atomic clock (via Cary Secrest's radio controlled digital watch) prior to equipment operation as detailed in Section II.

We assess that 70% or more of the observed Fisher controllers leaked VOCs constantly, and up to 8% of the 196 tanks observed had thief hatch emissions. The percentage of leaking Enardo valves cannot be accurately stated from field notes but were on the order of the tank leak rate. Two of the 18 multi-well site flares were emitting excessively due to incorrect program logic controller settings.

Lasalle County Region

Site Name(s)	Naylor Jones 185, East, 100, and 205.
Lat/Long	28.415667, -98.895361
Date/Time	09/27/16 @ 10:40
Number of Tanks	19. No FLIR-visible hatch emissions.
Wind	Calm to 0.5 m/s
FLIR MOV_	_0085 – Flare. _0086 – Fisher controller emissions. _0087 - VRT inlet suction scrubber flange.
Notes	VOC leaks were found at a Fisher controller and VRT inlet suction scrubber flange. PID concentrations ranged 100 – 300 ppbV downwind of the northern tank battery.

Site Name(s)	Naylor Jones 103, 183, 102, 91.
Lat/Long	28.421972, -98.8796211
Date/Time	09/27/16 @ 11:52
Number of Tanks	20. No FLIR-visible hatch emissions.
Wind	N @ 1.5 m/s
FLIR MOV_	_ 0091 – Leaking Enardo Valve at Naylor Jones 91. _0092 - Leaking natural gas actuated flare vent gas controller. _0093 – leaking Enardo valve above tank "EOG Oil 4" at Naylor Jones 103, looking south. _0094 – leaking Enardo valve above tank "EOG H_2O 1" produced water tank, Naylor Jones 103; on common vent line as _0093 valve. _0095 – leaking Endardo valve above tank "EOG Oil 4," Naylor Jones 91. _0110 – Enardo leak on Naylor Jones 103 after repairs.
Notes	At 12:58, an EOG maintenance crew arrived to diagnose the leaking Enardo valves and vent gas controller. We returned at 16:01 after repairs were made and confirmed that the valve emissions were reduced.

Site Name(s)	Naylor Jones 36, 53, 54, 127
Lat/Long	28.420194, -98.860472
Date/Time	09/27/16 @ 13:24
Number of Tanks	20. FLIR-visible emissions from at least one tank.
Wind	N @ 1.5 m/s
FLIR MOV_	_0098 – Emissions from Naylor Jones 54 tanks. _0099 – Emissions from UltraFab vent. _0100 – Emissions from UltraFab vent. _0101 – UltraFab chemical pump supplying Triazene.
Notes	N.J. 127/53 – All 4 Fisher controllers on 3-phase separators leaking and several high ppm leaks on "UltraFab" H_2S removal unit; flare is operating with normal plume. N.J. 36/54 – 3 of 4 Fisher controllers were leaking, concentration > 100 ppmV; there were no FLIR-visible emissions from the 4 Enardo valves. Mr. Guiliani said that the UltraFab unit will be converted to compressed air along with the Fisher controllers.

Site Name(s)	Naylor Jones 51, 52, 55, 37
Lat/Long	28.420722, -98.841417
Date/Time	09/27/16 @ 14:27
Number of Tanks	9. FLIR-visible emission from one tank.
Wind	N @ 1.0 m/s
FLIR MOV_	_0103 – Fisher controller emissions. _0104 - Hatch leak from crude oil tank. _0105 – Emissions from Enardo valve on Naylor Jones 37. _0106 – Collection of Fisher controller emissions.
Notes	There were no FLIR-visible emissions from the 4 Enardo valves.

Site Name(s)	Naylor Jones 39, 57, 56, 38
Lat/Long	28.42075, -98.820417
Date/Time	09/27/16 @ 15:16
Number of Tanks	18. No FLIR-visible emissions.
Wind	NW @ 1.2 m/s
FLIR MOV_	_0109 - Fisher controller emissions.
Notes	All 16 Fisher controllers were leaking; no FLIR-visible leaks were apparent from the 8 Enardo valves.

Site Name(s)	Naylor Jones 16, 21E, 21W, 9
Lat/Long	28.475806, -98.832917
Date/Time	09/28/16 @ 10:25
Number of Tanks	16. No FLIR-visible emissions.
Wind	NNE @ 1.2 m/s
FLIR MOV_	None.
Notes	9 of 12 Fisher controllers were leaking. No FLIR-visible leaks from the 4 Enardo valves.

Site Name(s)	Naylor Jones 17E, 17W.
Lat/Long	28.467583, -98.846972
Date/Time	09/28/16 @ 11:23
Number of Tanks	6. No FLIR-visible emissions.
Wind	N @ 0.5 m/s
FLIR MOV_	_0111 – Fisher valve emissions. _0112 and _0113 - Excessive VOC plume from the flare. _0114 - same flare plume after flare blower speed was reduced after remote-in flare reprogramming by EOG operations. _0115 – Same flare with increased flare blower speed.
Notes	The site flare blower speed was too high for the vent gas inlet rate causing incomplete VOC combustion. Mr. Guiliani called EOG operations who remotely reprogrammed the flare to operate at the correct speed. 3 of 5 Fisher controllers were leaking. There were no FLIR-visible emissions from the 4 Enardo valves.

Site Name(s)	Naylor Jones 35E, 19.
Lat/Long	28.467083, -98.859861
Date/Time	09/28/16 @ 12:54
Number of Tanks	8. No FLIR-visible emissions.
Wind	N @ 2.1 m/s
FLIR MOV_	_0120 and _0121 – Visible smoking flare. _0122 Enardo valve emissions on Naylor Jones 35E.
Notes	Smoking flare; air assist blower not operating. Flare tech arrived at 13:12 and found that the program logic controller setting for the blower was incorrect and repaired the problem. 8 of 12 Fisher controllers were leaking. 1 of 4 Enardo valves had intermittent FLIR-visible emissions.

Site Name(s)	Naylor Jones 35W, 18, 72, and 84.
Lat/Long	28.465278, -98.875806
Date/Time	09/28/16 @ 13:52
Number of Tanks	19. No FLIR-visible emissions.
Wind	NNW @ 0.5 m/s
FLIR MOV_	_0123 – Enardo valve emissions on Naylor Jones 18. _0124 – Leak on Naylor Jones 72 connector (repaired on site).
Notes	Pneumatics at tank battery Naylor Jones 35W/18 are operated on compressed air; PID readings downwind of the battery were in the low ppbV; typical PID concentrations downwind of natural gas operated batteries have been in the 100 – 500 ppbV range due to leaking Fisher controllers. Pneumatics at Tank battery Naylor Jones 72/84 are operated on natural gas; 8 of 12 Fisher controllers were leaking. Two of the 8 Enardo valves had FLIR-visible emissions.

Site Name(s)	Naylor Jones 169, 145, 85W, 155.
Lat/Long	28.464528, -98.885889
Date/Time	09/28/16, 14:32
Number of Tanks	20. No FLIR-visible emissions.
Wind	Light and variable.
FLIR MOV_	_0125 – Naylor Jones 169/145 flare. _0126 – Enardo valve emissions on Naylor Jones 169.
Notes	Flare was operating and the plume was normal; manual air inlet damper, no program logic controller. 22 of 28 Fisher controllers were leaking. 1 of 4 Enardo valves had FLIR-visible emissions.

Gonzales County Region

Site Name(s)	Santana Unit
Lat/Long	29.195028, -97.617
Date/Time	09/29/16 @ 09:50
Number of Tanks	4. FLIR-visible emissions from hatch area of 3 tanks.
Wind	NW @ 2.3 m/s
FLIR MOV_	_0128 Tank top emissions from Santana unit.
Notes	3 of 4 Fisher controllers were leaking. 1 fixed roof tank contained hydrocarbon for crude oil blending. Flare was operating with a normal plume.

Site Name(s)	Fogarty/Petty
Lat/Long	29.201694, -97.605083
Date/Time	09/29/16 @ 10:40
Number of Tanks	10 (2 contain pentane). FLIR-visible emissions.
Wind	N @ 1.1 m/s
FLIR MOV_	_0130 – Enardo valve emissions on Fogerty Unit. _0131 – Tank top emissions on Petty unit. _0132 - Survey of 5 tanks. Significant emissions from one or more tanks. _0133 – Crude oil tank at Petty Unit. _0134 – Tank top emissions on Fogerty produced water tank.
Notes	Pneumatics all operated with compressed air.

Site Name(s)	Vaughn
Lat/Long	29.229389, -97.629361
Date/Time	09/29/16 @ 11:39
Number of Tanks	4. FLIR-visible emissions from produced water tank and oil tank #2.
Wind	NE @ 1.4 m/s
FLIR MOV_	_0136 – Tank hatch emissions on Vaughn unit produced water tank.
Notes	2 of 4 Fisher controllers were leaking. The 2 Enardo valves were not leaking.

Site Name(s)	Hilbrich Unit
Lat/Long	29.209861, -97.537917
Date/Time	09/29/16 @ 13:07
Number of Tanks	8. No FLIR-visible emissions.
Wind	NE @ 1.4 m/s
FLIR MOV_	None.
Notes	2 of 6 Fisher controllers and 1 of 4 Enardo valves were leaking. Flare had incipient soot but good VOC combustion.

Site Name(s)	Borchers Trust
Lat/Long	29.221611, -97.544806
Date/Time	09/29/16 @ 13:45
Number of Tanks	8. No FLIR-visible emissions.
Wind	NE @ 4 m/s
FLIR MOV_	None.
Notes	Pneumatics operate on compressed air. Flare was operating with good combustion.

Site Name(s)	Borchers Koenning
Lat/Long	29.215222, -97.550389
Date/Time	09/29/16 @ 14:22
Number of Tanks	8. No FLIR-visible emissions.
Wind	NE @ 4 m/s
FLIR MOV_	None
Notes	Flare in operation, good combustion.

Site Name(s)	BLT Unit
Lat/Long	29.194167, -97.550139
Date/Time	09/29/2016 @ 14:54
Number of Tanks	8. No FLIR-visible emissions.
Wind	N @ 2.0 m/s
FLIR MOV_	None.
Notes	2 of 6 Fisher controllers and 2 of 4 Enardo valves were leaking. Flares were operating with good combustion.

Site Name(s)	Rucker and Hagar Units
Lat/Long	29.183447, -97.541944
Date/Time	09/29/16 @ 15:15
Number of Tanks	7. FLIR-visible emissions.
Wind	N @ 5 m/s
FLIR MOV_	_0142 - Excessive emissions most likely from Hagar oil tank #1.
Notes	Potentially excessive FLIR-visible emissions from the flare; flare was operating with 1:17 to 1:20 vent gas to assist air ratio. 1 of 4 Enardo valves was leaking. Pneumatic controllers are on compressed air.